IFW AF/3682

120

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No. 066291-0320

In Re Application Of: **T. ALBERTSSON**

Serial No.	Filing Date	Examiner	Group Art Unit
09/902,536	July 11, 2001	C. M. HANSEN	3682

Invention: **MANIPULATOR**

TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on **March 9, 2004.**

The fee for filing this Appeal Brief is: **$330.00**

☐ A check in the amount of the fee is enclosed.

☒ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **04-2223.**

Signature

Dated: **May 10, 2004**

Adesh Bhargava, Reg. No. 46,553
DYKEMA GOSSETT PLLC
1300 I Street, N.W., Suite 300 West
Washngton, D.C. 20005
(202) 906-8696

I certify that this document and fee is being deposited on with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature of Person Mailing Correspondence

Typed or Printed Name of Person Mailing Correspondence

cc:

PATENT
ATTORNEY DOCKET NO.: 066291-0320

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
	)	
T. ALBERTSSON	)	
	)	
Application No.: 09/902,536	)	Group Art Unit: 3682
	)	
Filed: July 11, 2001	)	Examiner: C. M. HANSEN
	)	
For: MANIPULATOR	)	

Commissioner for Patents
Washington, D.C. 20231

Sir:

APPELLANT'S BRIEF UNDER 37 C.F.R. § 1.192

This brief is in furtherance of the Notice of Appeal filed in connection with this application on March 9, 2004, and appealing the final rejection of claims 2-6 and 11 mailed December 17, 2003. The fees required under 37 C.F.R. § 1.17(c) are being filed concurrently herewith. This brief is transmitted in triplicate.

1. The Real Party in Interest

The real party in interest in this appeal is ABB AB, of SE-721 83 Vasteras, Sweden.

2. Related Appeals and Interferences

Appellant is not aware of any other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal.

3. Status of Claims in Application

The status of the claims is as follows:

Claims canceled: 1 and 7-10

Claims pending: 2-6 and 11

Claims withdrawn from consideration but not canceled: None

Claims allowed: None

Claims rejected: 2-6 and 11

The claims on appeal are 2-6 and 11.

4. Status of Amendments

Since the issuance of the December 17, 2003 Final Office Action, which was issued in response to an Amendment filed September 24, 2003, no further Amendments have been filed. However, the specification has been amended herein for a minor informality for correcting a typographical error between the English translation filed July 11, 2001 of Swedish Priority document No. 0002654-2 as shown in the Appendix. As a note, the December 17, 2003 Final Office Action is the second Final Office Action on the merits in this case which includes a Request for Continued Examination (RCE) filed on May 30, 2003.

5. Summary of Invention

Appellant's invention relates to an industrial robot including an anthropomorphic manipulator having a supporting device for holding cabling between two mutually movable arm parts so as to absorb any slack in the cabling by a predetermined and coordinated movement of the arm parts, (Page 1:5-13).

As discussed in the original specification, the present invention purports to solve a special problem existing in anthropomorphic robots, where the upper axis rotates about its own longitudinal axis, (Page 2:9-10). In such robots, the cabling must be capable of being wound up around the upper arm without conflicting with objects in the working range of the robot, (Page 2:10-15). Therefore, one key object of the present invention is to provide a device for holding and stretching the cabling such that loosely hanging loops are avoided. Compared to conventional robots, for anthropomorphic robots, the capability of holding and stretching the

cabling is needed because the required length of the cable bundle is increased due to the upper arm including a front arm part arranged for rotation about its longitudinal axis, such that the rotation would be significantly limited if the cabling were of a reduced length as in conventional robots.

Referring to Figs. 1 and 2 reproduced below, Appellant's invention includes an anthropomorphic manipulator having upper arm 1 including rear arm part 2 and front arm part 3 arranged for rotation about its longitudinal axis, (Page 6:27-30). Rear arm part 2 is supported by lower arm 4, and front arm part 3 is journalled in rear arm part 2 and is rotatable around first axis A, (Page 6:30-33). Front arm part 3 supports fork-shaped wrist 5 having journalled therein hand 6 further including a journalled turning disc 7 for supporting a tool (not shown), (Page 6:33 – Page 7:1). As shown in Fig. 1, turning disc 7 is rotatable around second axis B.

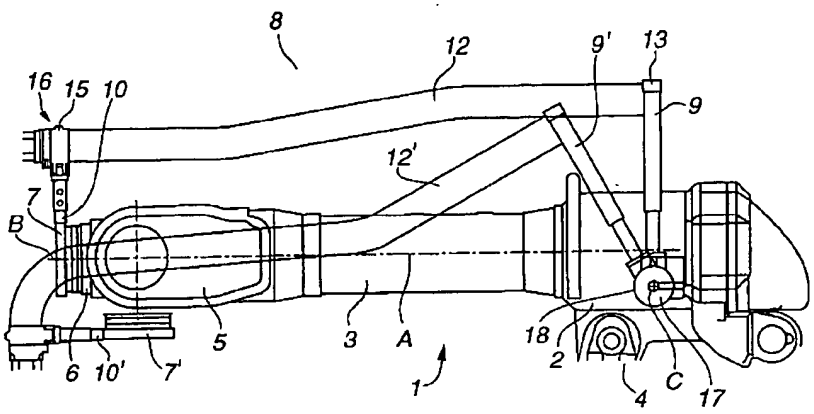

Fig. 1 of 09/902,536

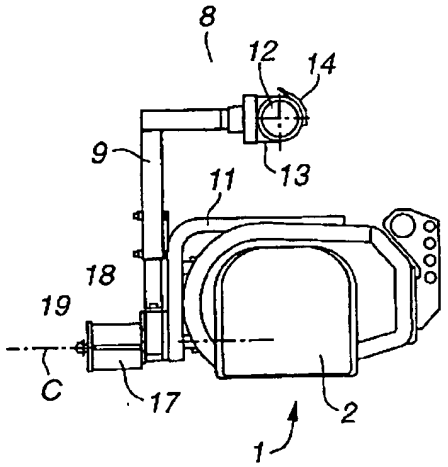

Fig. 2 of 09/902,536

As shown in Figs. 1 and 2, the anthropomorphic manipulator according to the present invention includes supporting device 8 including supporting arm 9 and auxiliary arm 10, with supporting arm 9 being journalled in a stand 11 which is fixed to rear arm part 2 and which is rotatable around a third axis C arranged across first axis A, (Page 7:4-9). Supporting arm 9 further includes in its outer end first attachment 13, which has been illustrated as snap-in closure 14 for mounting and dismounting one end of cabling 12, (Page 7:9-11). Likewise, auxiliary arm 10 includes second attachment 15 with snap-in closure 16 for mounting and dismounting the other end of cabling 12, (Page 7:12-13). As shown in Fig. 2, supporting arm 9 further includes a right-

angled part at the top end thereof for supporting cabling 12 centrally over upper arm 1, (Page 7:15-17).

Referring specifically to Fig. 1, as hand 6 is rotated, the position of the auxiliary arm 10 adopted during such a movement is shown by the designation 10', the supporting arm by 9' and the cabling by 12', (Page 7:18-22). During this rotation of hand 6, supporting arm 9 exerts a spring force on cabling 12' by means of spiral spring 17 arranged around third axis C, (Page 7:24-26). Spring 17 is configured such that in an initial position of supporting arm 9, the spring force is directed backwards along cabling 12 (i.e. to the right in Fig. 1), and when supporting arm 9 is bent out (i.e. 9'), the spring force rotates in relation to the longitudinal direction of the cabling, (Page 7:30-34). Accordingly, in addition to providing a pulling force, supporting arm 9 also tends to lift the cabling, which is favourable when the cabling is wound up around rotatable front arm part 3, (Page 7:34 – Page 8:1). In order to prevent supporting arm 9 from exerting an uneven load on the cabling, the attachment of either supporting arm 9 or auxiliary arm 10, or both, may be arranged with an articulated attachment to the respective arm, (Page 8:1-5).

Accordingly, a key aspect of the present invention is to guide and hold the cabling stretched in the front area of the manipulator, such that the loop, which must be kept at disposal for the movement of the front robot arms, is arranged behind upper robot arm 1. The present invention thus achieves the aforementioend exemplary aspect by providing an anthropomorphic manipulator having upper arm 1 for winding cable 12 around the upper arm without conflicting with objects in the working range of the robot, by holding and stretching the cabling such that loosely hanging loops are avoided.

6. Issues

The claims on appeal (2-6 and 11) stand rejected under 35 U.S.C. § 103 (a) over the following prior art:

U.S. Patent No. 4,529,352 (*Suzuki*);

U.S. Patent No. 5,606,235 (*Mauletti*); and

U.S. Patent No. 5,593,265 to (*Kizer*).

The issue presented for review is whether the rejection of claims 2-6 and 11 under 35 U.S.C. § 103 (a) over *Suzuki*, *Mauletti* and *Kizer* should be reversed due to the lack of disclosure and the lack of teaching or suggestion of the features recited in each of the claims.

7. Groupings of Claims

Independent claim 11, and claims 2-6, which depend therefrom, stand or fall together and should be allowed if it is found that the Examiner has failed to establish a prima facie case of obviousness in concluding that the combined teachings of *Suzuki*, *Mauletti* and *Kizer*, teach or suggest each feature of Appellant's claimed invention.

8. Argument

The rejection of independent claim 11, and claims 2-6, which depend therefrom, is improper and should be reversed.

In the final rejection dated December 17, 2003, claims 2-6 and 11 were rejected under 35 U.S.C. § 103 (a) as being unpatentable over *Suzuki*, *Mauletti* and *Kizer*. Appellant traverses the rejection of claims 2-6 and 11 for the following reasons.

With regard to independent claim 11, Appellant respectfully asserts that *Suzuki*, *Mauletti* and *Kizer*, whether viewed singly or in combination, do not teach or suggest an anthropomorphic manipulator, including, "an upper arm which comprises a rear arm part and which further comprises a front arm part having a longitudinal axis, the front arm part being arranged for rotation about said longitudinal axis, cabling extending along the said arm parts and being arranged as to be wound around said front arm part when said front arm part is rotated about said longitudinal axis, the front arm part being journalled in bearings in the rear arm part for relative rotation, a supporting device for guiding and holding the cabling in a stretched condition at the front arm part, the supporting device comprising a supporting arm rotatably arranged on the rear arm part and an auxiliary arm arranged at the front arm part," as recited in independent claim 11.

As discussed above and as illustrated in Figs. 1 and 2 reproduced on the next page, the present invention provides an anthropomorphic manipulator, including an upper arm 1 having a rear arm part 2 and a front arm part 3 having a longitudinal axis A, with front arm part 3 being arranged for rotation about the longitudinal axis. Cabling 12 may extend along the arm parts and

be arranged as to be wound around front arm part 3 when the front arm part is rotated about longitudinal axis A. Front arm part 3 may be journalled in bearings in rear arm part 2 for relative rotation. A supporting device 8 may be provided for guiding and holding cabling 12 in a stretched condition at front arm part 3, with the supporting device including a supporting arm 9 rotatably arranged on rear arm part 2 and an auxiliary arm 10 arranged at front arm part 3.

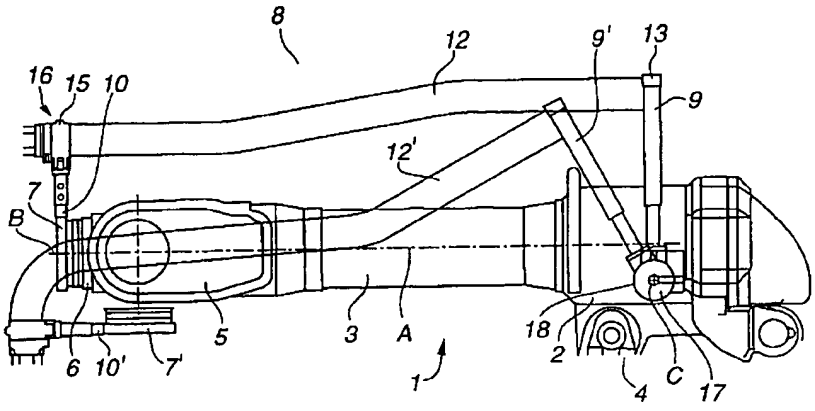

Fig. 1 of 09/902,536

The aforementioned arrangement, as recited in independent claim 11, is clearly distinguished over the teachings of *Suzuki*, *Mauletti* and *Kizer*, and further presents several distinct and unobvious advantages over the conventional cable support arrangements of *Suzuki*, *Mauletti* and *Kizer*, in a manner in which *Suzuki*, *Mauletti* and *Kizer* fail to recognize much less solve the problems addressed by the present invention.

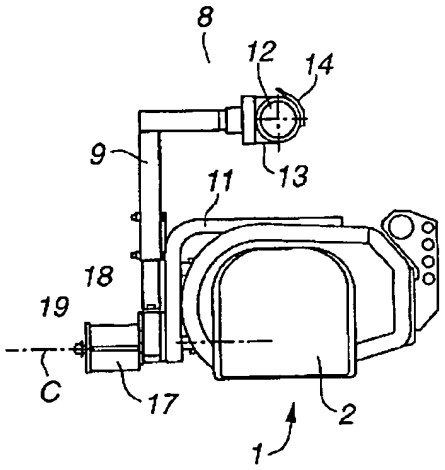

Fig. 2 of 09/902,536

For example, *Suzuki*, as illustrated in Fig. 2 reproduced at right and Fig. 3 reproduced on the next page, discloses a cable support of a robot which includes a movable support 3a mounted on operating arm 13 at the wrist-side end thereof and an auxiliary support at 41 mounted on operating arm 13 at the opposite end thereof to support cable 5 in a manner such that the supports can freely be rotated and tilted to readily follow the movement of the cable

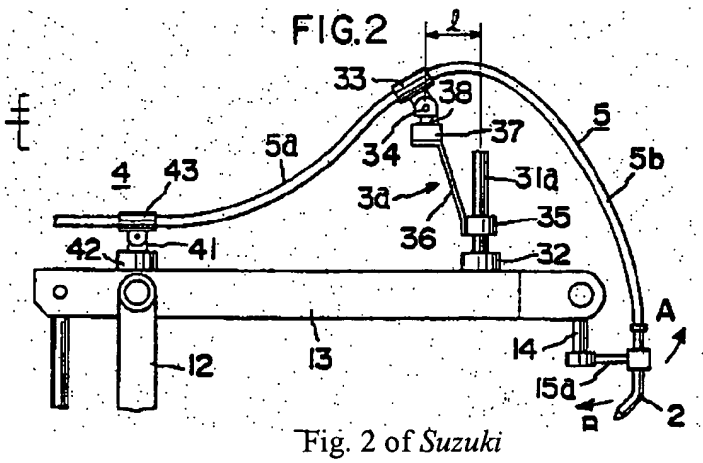

Fig. 2 of *Suzuki*

(Col. 1:40-46). Operating arm 13 tilts in an upward direction and downward direction (Col. 1:61-62). According to the *Suzuki* invention, the cable support described above enables cable 5 to readily and smoothly follow the rotation of movable support 3a, and the rotation and tilting of cable clamp 43 (on rotary shaft 41) and cable holder 33 (col. 3, lines 22 to 25).

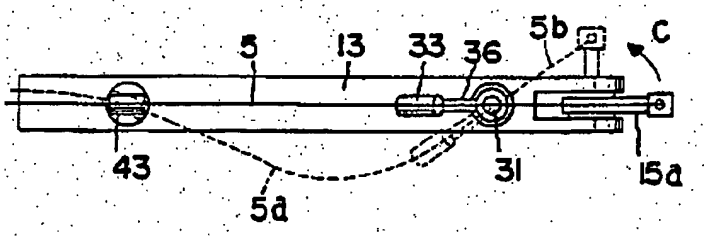

Fig. 3 of *Suzuki*

In accordance with the present invention, as discussed above, a supporting device 8 is provided for holding a part of cabling 12, which part extends between two mutually movable arm parts 9, 10 of the anthropomorphic manipulator, such that a slack of the cabling is absorbed (see Specification, page 1:8-11). As also set forth in the original specification, a special problem exists in anthropomorphic robots, where the upper axis rotates about its own longitudinal axis, (Page 2:9-12). In such robots, the cabling must be capable of being wound up around the upper arm. Thus, a surplus of the cabling must be arranged such that it can be wound around front arm part 3 of upper arm 1 when front arm part 3 rotates about its longitudinal axis A. A key object of the present invention is therefore to provide a device for holding and stretching the cabling such that loosely hanging loops are avoided, and stretching the cabling such that it does not conflict with objects in the working range of the robot.

In distinct contrast to the anthropomorphic manipulator disclosed for the present invention and recited in independent claim 11, the conventional industrial robot disclosed by *Suzuki* is not an anthropomorphic robot where the upper arm rotates about its own longitudinal axis as in the present invention. Instead, for the robot of *Suzuki*, second tilt arm 13 tilts upwardly and downwardly about an axis forming a hinged connection with first tilt arm 12 which tilts in a forward and backward direction. Thus the *Suzuki* robot operates in a completely different manner than the anthropomorphic manipulator disclosed for the present invention, and hence *Suzuki* fails to recognize much less solve the problems addressed by the present invention.

For example, cable 5 for *Suzuki* is not arranged such that it can be wound around the upper arm when this arm is rotated as is the case with the present invention. In other words, *Suzuki* does not teach or suggest, "cabling extending along the said arm parts and being arranged

as to be wound around said front arm part when said front arm part is rotated about said longitudinal axis," as recited in independent claim 11. Instead, as shown in Figs. 2 and 3 of *Suzuki*, reproduced at right, cable 5 of *Suzuki* is supported in the shape of a crown making the cable supporting portion of the movable support 3a as a peak and providing slacks on the cable portions 5a and 5b which dispose at both sides of the peak, as shown in dotted outline in Fig. 3 of *Suzuki*. Thus, *Suzuki* also does not teach or suggest, "a supporting device for guiding and holding the cabling in a stretched condition at the front arm part, the supporting device comprising a supporting arm rotatably arranged on the rear arm part and an auxiliary arm arranged at the front arm part," as recited in independent claim 11. This clearly contrasts with the arrangement according to the present invention in which the supporting device is provided for guiding and holding the cable in a stretched condition (not slacked as in *Suzuki*) at front arm part 3 of upper arm 1. The supporting device according to the present invention thus holds and stretches the cable such that loosely hanging loops are avoided and such that the cable does not conflict with objects in the working range of the robot. The cable support device of *Suzuki*, on the other hand, is not capable of functioning in such a manner, such that the cable is firmly supported.

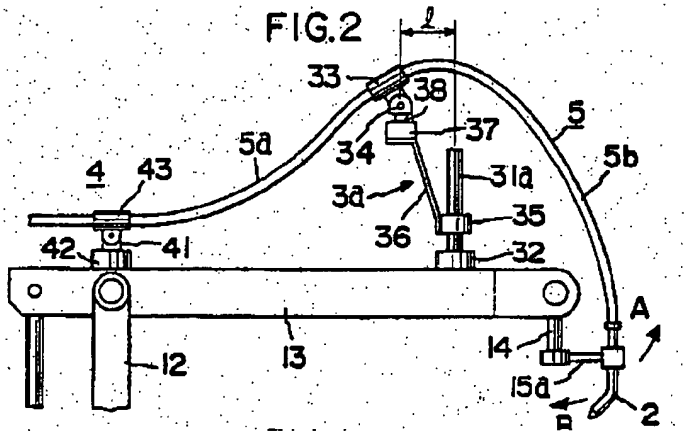

Fig. 2 of *Suzuki*

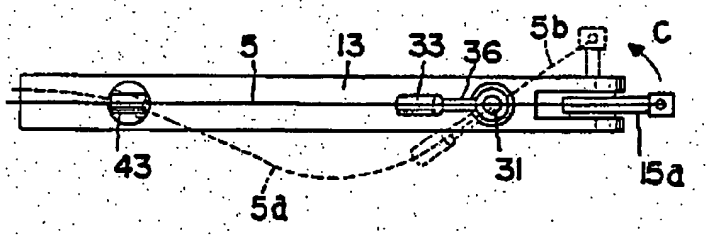

Fig. 3 of *Suzuki*

Moreover, Appellant respectfully asserts that the *Suzuki* disclosure provides no suggestion or motivation for applying the cable support disclosed therein to an anthropomorphic manipulator in which the cabling extends along front and rear arm parts of the upper arm of the manipulator and is arranged as to be wound around the front arm part when that front arm part is rotated about is longitudinal axis, as in the manner and for the purpose of the present invention.

In realizing the aforementioned deficiencies in the teachings of *Suzuki*, the December 17, 2003 Office Action cites *Mauletti* (for the first time) for disclosing an anthropomorphic manipulator and thereby concludes that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized the immediate rotating portion of Mauletti (US Pat. 5,606,235) arm within Suzuki et al (US Pat. 4,529,35[2]) so as to allow for increased position and degrees of freedom for the end effector of Suzuki et al (US Pat. 4,529,35[2])."

Appellant respectfully disagrees with this unfounded conclusion for several reasons.

Specifically, *Mauletti*, as illustrated in Fig. 1 reproduced below, discloses a robot having a plurality of elements amongst which one of the elements includes an anthropomorphic manipulator at 12 having a front arm part arranged for rotation about its longitudinal axis. Accordingly, Appellant respectfully agrees with the Examiner in that *Mauletti* indeed discloses a robot having a plurality of elements including an anthropomorphic manipulator. However, Appellant is readily aware of the existence of anthropomorphic manipulators having a front arm part arranged for rotation about its longitudinal axis and the mere fact that *Mauletti* discloses an anthropomorphic manipulator does not validate the conclusion that the teachings of *Mauletti* and *Suzuki* render the invention recited in claim 11 of the present invention obvious.

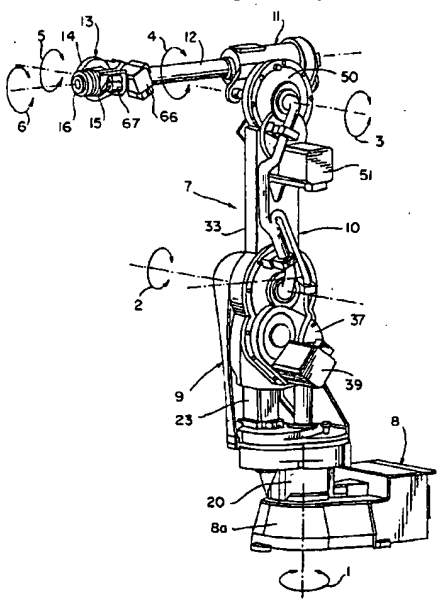

Fig. 1 of *Mauletti*

As such, Appellant respectfully asserts that the combination of *Suzuki* and *Mauletti* as suggested in the Office Action would be unwarranted, impractical, and would nevertheless not come up with what Appellant has achieved herein.

Appellant thus respectfully further asserts that the Examiner has failed to meet the burden set forth in M.P.E.P. § 2142 for establishing a prima facie case of obviousness in concluding that the combined teachings of *Suzuki* and *Mauletti*, teach or suggest each feature of claims 2-6 and 11. Specifically, Examiner has failed to meet the following three basic required criteria:

* First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Appellant respectfully asserts that the Examiner has provided no motivation whatsoever for combining the teachings of 2-6 and 11, but has merely concluded that since *Mauletti* discloses an anthropomorphic manipulator, that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized the immediate rotating portion of Mauletti (US Pat. 5,606,235) arm within Suzuki et al (US Pat. 4,529,35[2]) so as to allow for increased position and degrees of freedom for the end effector of Suzuki et al (US Pat. 4,529,35[2])." Appellant respectfully agrees with the Examiner that it would indeed be beneficial to have an anthropomorphic manipulator having a front arm part arranged for rotation about its longitudinal axis with increased position and degrees of freedom. However, Appellant is unclear as to how the support arms and cable grasping components of *Suzuki* could be used with the robot of *Mauletti*, as suggested by the Examiner, as the two robots operate on entirely different principles. Moreover, Appellant respectfully asserts that even if the teachings of *Suzuki* were applied to the robotic device of *Mauletti*, one of ordinary skill in the art would still fail to achieve Appellant's invention in that cable 5 for *Suzuki* is not arranged such that it can be wound around the upper arm when this arm is rotated as is the case with the present invention (see also recitation in independent claim 11 of present invention). Instead, as shown in Figs. 2 and 3 of *Suzuki*, reproduced above, cable 5 of *Suzuki* is supported in the shape of a crown making the cable supporting portion of the movable support 3a as a peak and providing slacks on the cable portions 5a and 5b which dispose at both sides of the peak, as shown in dotted outline in Fig. 3 of *Suzuki* (see also recitation in independent claim 11 of present invention). This clearly contrasts with the arrangement according to the present invention in which the supporting device is provided for guiding and holding the cable in a stretched condition (not slacked as in *Suzuki*) at front arm part 3 of upper arm 1. The supporting device according to the present

invention thus holds and stretches the cable such that loosely hanging loops are avoided and such that the cable does not conflict with objects in the working range of the robot. The cable support device of *Suzuki*, on the other hand, is not capable of functioning in such a manner, such that the cable is firmly supported. Accordingly, one of ordinary skill in the art could not apply the teachings of *Suzuki* to the robotic device of *Mauletti* as the two devices function in entirely different manners and therefore present a variety of unique and different problems associated with their specific operation.

* Second, there must be a reasonable expectation of success. As discussed above, even if the teachings of *Suzuki* were applied to the robotic device of *Mauletti*, one of ordinary skill in the art would still fail to achieve Appellant's invention and the combination would still fail to teach or suggest the anthropomorphic manipulator having a front arm part arranged for rotation about its longitudinal axis, as recited in independent claim 11 of the present invention. Moreover, as also discussed above, one of ordinary skill in the art would not arbitrarily apply the teachings of *Suzuki* to the robotic device of *Mauletti* as the two devices function in entirely different manners and therefore present a variety of unique problems associated with their specific operation (i.e. *Suzuki* teaches a slacked cable, whereas *Mauletti* would require a stretched cable, as disclosed for the present invention and recited in independent claim 11).

* Finally, the prior art reference, and not the Appellant's disclosure must teach or suggest all the claim limitations. Based upon the discussion above, Appellant respectfully asserts that the mere combination of two entirely different teachings of *Suzuki* and *Mauletti*, in itself, without the requisite motivation or expectation of success, clearly proves that it is Appellant's disclosure that teaches the claim limitations and not the teachings of the prior art references.

Lastly, Appellant respectfully notes that *Kizer*, which has been cited as disclosing a spiral spring (recited in dependent claim 5) also fails to overcome the aforementioned deficiencies of *Suzuki* and *Mauletti.*

As pointed out in M.P.E.P. § 2143.03 points out that "[t]o establish prima facie obviousness of a claimed invention, all the claimed limitations must be taught or suggested by the prior art. In re Royka, 409 F.2d 981, 180 USPQ 580 (CCPA 1974)." Since this criterion has not been met, Appellant respectfully submits that *Suzuki*, *Mauletti* and *Kizer*, whether taken alone or in combination, clearly neither teach nor suggest the novel combinations of features recited in independent claim 11, and hence dependent claims 2-6. Accordingly, the rejection under 35 U.S.C. § 103 of claim 11 should be reversed.

9. Conclusion

In view of the foregoing, Appellant respectfully requests the reversal of the Examiner's rejections and allowance of the pending claims.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 04-2223. If a fee is required for an extension of time under 37 C.F.R. §1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

DYKEMA GOSSETT PLLC

Dated: May 10, 2004

By: _____
Adesh Bhargava
Reg. No. 46,553

DYKEMA GOSSETT PLLC
1300 I Street, N.W., Suite 300 West
Washington, D.C. 20005
(202) 906-8696

APPENDIX

SPECIFICATION

Please replace the paragraph beginning on page 2, line 9 with the following rewritten paragraph:

A special problem exists in anthropomorphic robots, where the upper axis rotates around its own longitudinal axis. In such robots, the cabling must be capable of being wound up around the upper arm. In such contexts, it is usual for the arm to be able to rotate, from an initial position, more than half a turn in both directions. The line bundle must therefore extend along the envelope surface of the robot arm. When the arm is in its neutral position, the necessary length is equal to the length of the arm. During rotation half a turn, however, the required length increases. The increase corresponds to the case where the line bundle, during rotation, must be laid half a turn around the envelope surface of the robot arm. This distance constitutes half the circumference of a circle with a radius defined by the distance between the axis of rotation and the centre of the line bundle. A calculation shows that the required length of the line bundle becomes between 20 and 50% ~~lower~~ longer than the arm itself.

CLAIMS

1. (Canceled)

2. (Currently Amended) A manipulator according to claim 11, wherein the supporting arm comprises an angled part which permits the cabling to be held stretched centrally over the ~~first~~ front arm.

3. (Previously Amended) A manipulator according to claim 11, wherein the auxiliary arm is arranged at a turning disc of the manipulator.

4. (Previously Amended) A manipulator according to claim 11, wherein the supporting arm and the auxiliary arm support a bendable tube for reception of the cabling.

5. (Previously Amended) A manipulator according to claim 11, wherein the supporting arm has a spiral spring for exerting a spring force on the cabling.

6. (Previously Amended) A manipulator according to claim 5, wherein the spiral spring is housed in a container.

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (Canceled)

11. (Previously Added) An anthropomorphic manipulator, comprising an upper arm which comprises a rear arm part and which further comprises a front arm part having a longitudinal axis, the front arm part being arranged for rotation about said longitudinal axis,

cabling extending along the said arm parts and being arranged as to be wound around said front arm part when said front arm part is rotated about said longitudinal axis, the front arm part being journalled in bearings in the rear arm part for relative rotation, a supporting device for guiding and holding the cabling in a stretched condition at the front arm part, the supporting device comprising a supporting arm rotatably arranged on the rear arm part and an auxiliary arm arranged at the front arm part.